1. **Background**

The survey data provided to us by the Dog Aging Project afforded us many avenues to analyze the health of domestic dogs across the country from both an epidemiological standpoint, such as lifestyle determinants of age-related diseases within our population, as well as a socioeconomic standpoint, such as whether the income of a given owner has a substantive effect on the health of a given canine. This analysis attempts to add a third prong to our approach, namely in the form of a psychological analysis. While the practice of neutering or spaying dogs is emphatically supported by veterinary science professionals to aid in the reduction of detrimental sexual behaviors and health risks exhibited in dogs, such as roaming, urine marking, the birthing of unplanned litters, and the development of certain types of cancers, less studies have been conducted to ascertain the relationship between neutering, spaying, and the behavioral development of dogs. This analysis explores this relationship within our population in an effort to assess if further empirical studies are warranted.

1. **Data Acquisition**

The data provided to the *k-means-k-9s* team came to us from the Dog Aging Project in tabular form, as csv files. The data was differentiated by the domain of the survey, as defined below:

* **CSLB:** This survey is sent to study participants annually to assess age-related cognitive and behavioral changes in dogs. The first time a participant takes the survey, a baseline cognitive score for their dog is established. Administering the survey in subsequent years allows the organization to assess the cognitive state of dogs over an extended period of time.
* **ENVIRONMENT:** The environment dataset was the only non-survey dataset provided. This dataset contains a single unique record for each dog captured, and provides a snapshot of environment factors that may impact a dog’s health over time, such as the presence of pollutants, temperature, and walkability of the dog’s locale. This data is updated by the Dog Aging Project on a monthly basis.